Competitiveness and the Climate Change Policy: Avoiding Leakage of Jobs and Emissions

By:

Margo Thorning, Ph.D.
Senior Vice President and Chief Economist
American Council for Capital Formation
Before the
Subcommittee on Energy and Environment
Committee on Energy and Commerce
U.S. House of Representatives
March 18, 2009

Executive Summary

Impact of Climate Change Policy on the U.S. Economy and Competitiveness

Recent private and government analyses of the impact of cap and trade proposals such as the Lieberman-Warner bill(S.2191), which sets targets to reduce GHGs to 15 percent below 2005 levels by 2020 and to 70 percent below by 2050, show that there are likely to be significant adverse consequences for the U.S. economy and job growth. Higher energy prices slow economic growth. An ACCF/NAM study shows that GDP declines by as much as 1 percent in 2020 and by up to 2.7 percent in 2030. Total U.S. employment (net of new jobs created in green industries) declines by 1,210,000 to 1,800.000 jobs in 2020 and by as many as 4,100,000 in 2030, compared to the baseline forecast.

Obama Administration Climate Change Proposal: Impact on the U.S. Economy

The climate change plan outlined in the Administration's FY 2010 budget sets a target of 14 percent below 2005 levels by 2020 and 83 percent below by 2050 with 100 percent auctioning from the beginning. The Administration appears to expect the price of a carbon allowance to be approximately $13 to $16 dollars per ton of CO2 and that its cap and trade proposal would yield $675 over the 2012-2019. Based on the various studies cited above, the estimated payments to the Federal government for carbon permits seem far too low.

Role of Border Tax Adjustments in Addressing Competitiveness and Leakage from U.S. Climate Change Policy

While some policymakers suggest that combining a U.S. climate change proposal with import restrictions(called Border Tax Adjustments or BTA's) could reduce the U.S. job loss and emission leakage from higher energy prices, others experts say that BTA's would pose a serious threat to the international trading system and could violate provisions of the WTO.

Strategies to Reduce Global and U.S. GHG Emission Growth

Two initiatives, a cap and trade approach and a tax on carbon emissions are currently receiving support from policymakers. A cap and trade system puts an absolute restriction on the quantity of emissions allowed (i.e., the cap) and allows the price of emissions to adjust to the marginal abatement cost (i.e., the cost of controlling a unit of emissions). A carbon tax, in contrast, sets a price for a ton of emissions and allows the quantity of emissions to adjust to the level at which marginal abatement cost is equal to the level of the tax. Many experts conclude that there are substantial advantages to employing a tax on emissions rather than a cap and trade approach. Technology development and transfer can play a key role in slowing the growth of GHGs. Improving U.S. cost recovery allowances for energy efficient and less emitting technologies and continuing to develop international programs like the Major Economies Initiative and others are cost effective approaches to improving the environment as well as strengthening the U.S. economy.

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Introduction

Mr. Chairman and members of the Subcommittee on Energy and Environment of the Committee on Energy and Commerce, my name is Margo Thorning, senior vice president and chief economist, American Council for Capital Formation (ACCF),* Washington, D.C. I am pleased to present this testimony to the Subcommittee.

The American Council for Capital Formation represents a broad cross-section of the American business community, including the manufacturing and financial sectors, Fortune 500 companies and smaller firms, investors, and associations from all sectors of the economy. Our distinguished board of directors includes cabinet members of prior Democratic and Republican administrations, former members of Congress, prominent business leaders, and public finance and environmental policy experts. The ACCF is celebrating over 30 years of leadership in advocating tax, regulatory, environmental, and trade policies to increase U.S. economic growth and environmental quality.

Chairman Markey, Ranking Member Barton, and the members of the Subcommittee Committee on Energy and Environment are to be commended for their focus on how policies to reducing the growth of greenhouse gas emissions so as to mitigate the threat of human-induced climate change may affect job growth and competitiveness. Given the extremely weak state of the U.S. economy, a cautious approach to reducing. greenhouse gas emission growth is clearly warranted. The questions we need to ask are first, what are the likely impacts of cap and trade or carbon tax proposal on the U.S economy, job growth and competitiveness and second, what are

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cost effective strategies to slow both U.S. and global GHG growth? My testimony will address these key issues.

I. Impact of Climate Change Policy on the U.S. Economy and Competitiveness

Recent private and government analyses of the impact of cap and trade proposals such as the Lieberman-Warner bill(S.2191), which sets targets to reduce GHGs to 15 percent below 2005 levels by 2020 and to 70 percent below by 2050, show that there are likely to be significant adverse consequences for the U.S. economy and job growth. **(See Table 1)**. For example, an analysis by the American Council for Capital Formation and the National Association of Manufacturers of S.2191 showed that by 2020, the cost of an emission allowances that industry would need to purchase that year for each ton of CO2 emitted would range from $55 and $64 dollars(see study at http://www.accf.org/pdf/NAM/fullstudy031208.pdf).

Results of other modeling efforts from CRA International, DOE's Energy Information Administration, the U.S. Environmental Protection Agency and the Massachusetts Institute of Technology show a similar range of allowance prices, especially when the availability of carbon capture and storage and new nuclear generation capacity are constrained **(see Table 1)**. By 2030, carbon allowances prices are higher due to the tightening of mission reduction targets, increased demand and U.S. population growth.

Higher energy prices slow economic growth, the ACCF/NAM study shows that GDP declines by as much as 1 percent in 2020 and by up to 2.7 percent in 2030. GDP losses in the other studies reported in **Table 1** show losses of up to 1.5 percent in 2020 and 2.3 percent in 2030.

The ACCF/NAM analysis shows that the drag of higher energy prices caused by the cap and trade system in S.2191 reduces total U.S. employment (net of new jobs created in green industries) by 1,210,000 to 1,800.000 jobs in 2020 and by as many as 4,100,000 in 2030, compared to the baseline forecast. In other analyses cited in **Table 1**, job losses range from 270,000 to 3,269,000 in 2020 and up to 2,393,000 by 030.

II. Obama Administration Climate Change Proposal: Impact on the U.S. Economy

- **Administration Revenue Estimates**

The climate change plan outlined in the Administration's FY 2010 budget sets a target of 14 percent below 2005 levels by 2020 and 83 percent below by 2050 with 100 percent auctioning from the beginning. The magnitude of the effort is shown in **Figure 1**, by 2020 CO2 emissions will have decline by over 1 billion tons, by 2030 the gap is approximately 3.5 billion tons (see **Figure 1**). Required reductions in per capita emissions will mean large changes in consumer behavior and in business practices. Currently, the average U.S. citizen is responsible for about 23 tons of CO2

per year. Under the Obama Administration proposal per capita emissions would have to fall to 18 tons in 2020 and 12 tons per capita by 2030(See **Figure 2**). Such large, rapid changes in emissions would mean sharp cut backs in energy use by households and business and significant changes in consumption patterns.

The Administration appears to expect the price of a carbon allowance to be approximately $13 to $16 dollars per ton of CO2 and that its cap and trade proposal would yield $675 over the 2012-2019. Based on the various studies cited above, the estimated payments to the Federal government for carbon permits seem far too low. In fact, the Administration's FY 2010 budget, "*A New Era of Responsibility, Renewing America's Promise*" appears to recognize that carbon auction revenues could exceed the projected $80 billion per year. Footnote 5 on page 129 of the Administration's budget states, in reference to the proceeds from the auctioning of carbon allowances that "All additional net proceeds will be used to further compensate the public".

A comparison of the revenues, based on DOE-EIA analysis, that would have been generated under the Lieberman/Warner bill (S.2191), if all allowances were auctioned further supports the idea that the Administration's revenue estimates are significantly understated. As shown in Figure 3, if all allowances were auctioned under Lieberman Warner, total revenues to the government would have ranged from $1,200 billion to $3,000 billion over the 2012-2019 period. (see bars with hash marks). Adjusting the Lieberman-Warner data for the fact that the Obama Administration target is less stringent in the early years than the L/W target, shows that even under EIA's core case, which assumes carbon capture and storage (CCS) is available, rapid expansion of new nuclear generation capacity, large use of domestic and international offsets, etc. shows that government revenues would exceed those estimated by the Administration (red bars). Using EIA's more realistic cases, where costs are higher, CCS is not readily available and nuclear generation capacity does not expand rapidly, shows that government revenues from the carbon auction would be double or triple the $675 billion revenue estimate for 2012-2019 in the Administration's budget.

- **Energy prices and U.S. Growth and Competitiveness**

The importance of getting the estimates of auction revenue (or carbon trading allowance proceeds) right from any climate change proposal is that higher energy prices will make it harder to restart U.S. economic and job growth. Each one percent increase in U.S. GDP growth is accompanied by a 0.3 percent increase in energy use: therefore, the higher the price of energy, the slower the rate of economic recovery.

A real world example of the effect that increased energy prices have on U.S. industry and employment can be observed by examining trends in the U.S. chemical industry. For example, chlorine is an essential chemical building block used in the production of pharmaceuticals, medical devices, safety equipment, computers, automobiles, aircraft parts and crop protection chemicals. Chlorine production in based on electro-chemistry and is one of the most energy-intensive production processes. In recent years, U.S. chlorine capacity has been shut down because of record high electricity costs arising from high natural gas prices, according to the American Chemistry

Council. In addition, a report by SRI Consulting indicates that ammonia capacity fell from 14.8 million tons in 1999 to 13.6 million tons in 2007, an 8% reduction. Data on global natural gas prices for the third quarter of 2008 show that U.S. producers face much higher prices than many other countries (see **Figure 4**), thus it is not surprising that much chemical production has migrated to lower cost locations.

Similarly, nitrogenous fertilizers play a major role in boosting crop yields and ammonia is the key raw material for these fertilizers. Ammonia production has also been affected by sharply rising natural gas prices. According to The Fertilizer Institute, from 1999-2007, 25 ammonia plants have been closed and a report by SRI Consulting indicates that ammonia capacity fell from 15.5 million metric tons in 1999 to 9.8 million metric tons in 2003, a 37% reduction. Approximately 120,000 jobs have been lost in the U.S. chemical industry since 1999, when natural gas prices began their sharp rise, according to the American Chemistry Council.

III. Role of Border Tax Adjustment in Addressing Competitiveness and Leakage from U.S. Climate Change Policy

While some policymakers suggest that combining a U.S. climate change proposal with import restrictions(called Border Tax Adjustments or BTA's) could reduce the U.S. job loss and emission leakage from higher energy prices, others experts say that BTA's would pose a serious threat to the international trading system and could violate provisions of the WTO.

As noted by the Forum for Atlantic Climate and Energy Talks (June 2008), there are several ways for a country to offset production cost differentials. First, imported energy sources containing CO2 may be taxed at the same rates that apply to domestic energy sources. Second, imported goods could be taxed at the border at a rate which reflects the costs that the emission trading system puts on domestic producers. Third, foreign exporters may be required to purchase emission rights for the carbon content of their goods in order to meet the required offsets.

There are significant challenges in implementing any of the three BTA options described above as Jason Bordoff writes in a recent paper prepared for a Brookings forum, " *International Trade Law and the Economics of Climate Policy: Evaluating the Legality and Effectiveness of Proposals to Address Competitiveness and Leakage Concerns*". Bordoff concludes that the consistency of border tax adjustments with WTO law is in doubt and the expected environmental benefits of border adjustments for carbon-intensive manufactured goods is likely to be quite small compared to the trade and WTO risks the pose.

IV. Strategies to Reduce Global and U.S. GHG Emission Growth

Climate change is a global issue which can not be solved unless all major countries curb their GHG emissions. In the U.S. there is strong interest in adopting a nationwide program to limit emissions. There are also initiatives to accelerate the adoption of cleaner, less emitting technologies through improvements to the U.S. tax code and to promote cleaner technology abroad.

- **Pros and Cons of a Cap and Trade System compared to a Carbon Tax**

Two initiatives, a cap and trade approach and a tax on carbon emissions are currently receiving support from policymakers. A cap and trade system puts an absolute restriction on the quantity of emissions allowed (i.e., the cap) and allows the price of emissions to adjust to the marginal abatement cost (i.e., the cost of controlling a unit of emissions). A carbon tax, in contrast, sets a price for a ton of emissions and allows the quantity of emissions to adjust to the level at which marginal abatement cost is equal to the level of the tax.

Price volatility for a permit to emit CO_2 can arise under a cap and trade program because the supply of permits is fixed by the government, but the demand for permits may vary considerably year to year with changes in fuel prices and the demand for energy. As mentioned above, price volatility for energy has negative impacts on economic growth. In contrast, a CO_2 tax fixes the price of CO_2, allowing the amount of emissions to vary with prevailing economic conditions. A carbon tax, as a system of inducing emissions reductions, is not without drawbacks. First, revenues from a CO_2 tax (or auctioned permits) might end up being wasted; for example, if the revenue went toward special interests, rather than substituting for other taxes. Second, progress on emissions reductions is uncertain under a CO_2 tax because emissions vary from year to year with economic conditions. However, a CO2 tax could be adjusted gradually upward if the desired reductions in emissions were not occurring.

As a study by Dr. Michael Canes, senior research fellow at LMI, points out, volatility in fossil energy prices have strong adverse impacts on U.S. economic growth. Even a reduction in the rate of growth from such a shock of as little as 0.1 percent per year implies costs of over $13 billion per year. (*Why a Cap &Trade is the Wrong Policy to Curb Greenhouse Gases for the United States,* The Marshall Institute, July, 2007).

Furthermore, it makes economic sense to allow nationwide emissions to vary on a year-to-year basis because prevailing economic conditions affect the costs of emissions abatement. This flexibility occurs under a CO_2 tax because firms can choose to abate less and pay more tax in periods when abatement costs are unusually high, and vice versa in periods when abatement costs are low. Traditional permit systems do not provide similar flexibility because the cap on economy wide emissions has to be met, whatever the prevailing abatement cost.

Regardless of how the auction revenues or allowances were distributed, most of the cost of meeting a cap on CO_2 emissions would be borne by consumers, who would face persistently higher prices for products such as electricity and gasoline. Those price increases would be regressive in that poorer households would bear a larger burden relative to their income than would wealthier households (see testimony by Terry M. Dinan of the Congressional Budge Office, March 12, 2009 before the Committee on Ways and Means Subcommittee on Income Security and Family Support). CBO's Dinan concludes that designing programs that protect low income households could be challenging and that no one program could address all the regional and household specific circumstances.

Finally, caps on U.S. emission growth are unlikely to succeed unless all the relevant markets exist (in both developed and developing countries) and operate effectively. All the important actions by the private sector have to be motivated by price expectations far in the future. Creating that motivation requires that emission trading establish not only current but future prices, and create a confident expectation that those prices will be high enough to justify the current R&D and investment expenditures required to make a difference.

Motivating new investment requires that clear, enforceable property rights in emissions be defined far into the future so that emission rates for 2030, for example, can be traded today in confidence that they will be valid and enforceable on that future date. The EU's experience over the last four years, with the price of CO_2 emission credits fluctuating between 8 and over 32 euros per ton of CO_2 does not inspire confidence in companies having to make investment decisions. The international framework for climate policy that has been created under the UNFCCC and the Kyoto Protocol cannot create that confidence for investors because sovereign nations have different needs and values.

A new study by Lee Lane and David Montgomery, *Political Institutions and Greenhouse Gas Controls* for the AEI Center for Regulatory and Market Studies (December 2008) concludes that institutions limit the extent to which efficient policies to reduce GHGs are likely to be adopted. The authors note that there are no third parties to enforce climate policy agreements and nations differ widely in their interest in restricting GHG emissions. Therefore, high transaction costs will attend efforts to reach and maintain broad GHG controls. So far, these transactions costs have blocked agreement and there seems little reason to expect that these constraints will soon vanish. The most likely course for future climate policy is drift and fragmentation, the authors conclude.

- **Environmental Impact of Mandatory U.S. GHG Emission Reductions**

As described above, meeting the mandatory reduction targets of proposed legislation such as the Lieberman Warner bill or the Obama Administration proposal is likely to have a significant impact on U.S. economic and job growth due to the sharply higher energy prices needed to bring down emissions. However, the U.S. climate change policies will have virtually no environmental benefits unless developing countries, whose emissions are growing strongly also participate. An noted in the new 2009 Council of Economic Adviser's Report to the President, global concentrations of CO2 in 2100 will be almost unaffected by U.S. emission reductions(See **Figure 5**). Thus, without strong international participation to reduce GHGs, the slower U.S. economic and job growth that would result from the emission reduction targets being debated by U.S. policymakers would yield little environmental benefit.

- **Role Technology Development**

Technology development and deployment offers the most efficient and effective way to reduce GHG emissions and a strong economy tends to pull through capital investment faster. There are only two ways to reduce CO_2 emissions from fossil fuel

use - use less fossil fuel or develop technologies to use energy more efficiently to capture emissions or to substitute for fossil energy. There is an abundance of economic literature demonstrating the relationship between energy use and economic growth, as well as the negative impacts of curtailing energy use. Over the long-term, new technologies offer the most promise for affecting GHG emission rates and atmospheric concentration levels.

- **Accelerating the Uptake of New Technology by Private as Well as Nonprofit Entities.**

The development of various high technology programs can be accelerated through government programs as well as by encouraging private sector investment. For example, some policies may be of particular help to taxable entities while others would be of more benefit to cooperatives (which pay little or no federal income tax).

- **Companies Subject to the Federal Income Tax**

The efforts of U.S. industries to increase energy security and efficiency and to reduce growth in GHG emissions are hindered by the slow rate of capital cost recovery allowed under the U.S. federal tax code and by the high U.S. corporate tax rate. As a new Ernst & Young international comparison shows, the U.S. ranks last or nearly last among our trading partners in terms of how quickly a dollar of investment is recovered for many key energy investments. For example, a U.S. company gets only 29.5.cents back through depreciation allowances for each dollar invested after 5 years for a combined heat and power project (see **Table 2**). In contrast, in China the investor gets 39.8 cents back, in Japan, 49.7 cents, in India, 55.6 cents and in Canada the investor gets 79.6 cents back after 5 years for every dollar invested. (See full report at: http://www.accf.org/pdf/Energy-Depreciation-Comparison.pdf.)

In addition to slow capital cost recovery allowances, U.S. industry faces the highest corporate income tax rates among our primary trading partners. Of the 12 countries in the E&Y survey, only Japan had a higher corporate tax rate than the U.S. Reforms to the U.S. tax code to speed up capital cost recovery allowances and reduce the corporate tax rate would reduce the cost of capital and could have a positive impact on energy sector investment, help "pull through" cleaner, less emitting new technology, increase energy efficiency and promote U.S. industrial competitiveness.

- **Non-Taxable Entities**

For non-taxable entities such as electric utility cooperatives other incentives could be provided to encourage the more rapid adoption of new technologies to reduce GHG emissions. For example, electric cooperatives and their consumers can not apply or benefit from traditional tax incentives because as not-for-profit utilities, they do not have significant federal income tax liability to offset. However, to ensure that the not-for-profit electric utility sector is able to participate in incentives for advanced low carbon technologies, incentives comparable to those offered to for profit entities can be created. One example is the successful Clean Renewable Energy Bond program that permits electric cooperatives and others to issue bonds that act as interest-free

loans for the purpose of building qualified renewable generation. The CREB program can be adapted for other technologies that achieve carbon reduction goals." Grants are another avenue to assist not-for-profits in adopting new technology.

- **The Role of International Partnerships in Promoting Institutional Change and Favorable Investment Climate in Developing Countries**

Research by Drs. David Montgomery and Sugandha Tuladhar of CRA International makes the case that agreements such as the Asia-Pacific Partnership on Clean Development and Climate (AP6), an agreement signed in 2005 by India, China, South Korea, Japan, Australia and the United States, offers an approach to climate change policy that can reconcile the objectives of economic growth and environmental improvement for developing countries. (See www.iccfglobal.org for the full paper.) Together, the AP6 partners have 45 percent of the world's population and emit 50 percent of man-made CO_2 emissions. The projections of very strong growth in greenhouse gases in developing countries over the next 20 years mean that there is enormous potential for reducing emissions through market-based mechanisms for technology transfer.

Drs. Montgomery and Tuladhar note that there are several critical factors for ensuring the success of an international agreement which relies strongly on private sector investment for success. Their research shows that institutional reform is a critical issue for the AP6, because the lack of a market-oriented investment climate is a principal obstacle to reducing greenhouse gas emissions in China, India and other Asian economies. China and India have both started the process of creating market-based economic systems, with clear benefits in the form of increased rates of economic growth. But the reform process has been slow and halting, leaving in place substantial institutional barriers to technological change, productivity growth, and improvements in emissions. The World Bank and other institutions have carried out extensive investigations about the role of specific institutions in creating a positive investment climate. These include minimizing corruption and regulatory burdens, establishing an effective rule of law, recognition of intellectual property rights, reducing the role of government in the economy, removing energy price distortions, providing an adequate infrastructure and an educated and motivated labor force.

- **Quantifying the Importance of Technology Transfer for Emission Reductions**

As described above, technology is critically important because emissions per dollar of income are far larger in developing countries than in the United States or other industrial countries. This is both a challenge and an opportunity. It is a challenge because it is the high emissions intensity – and relatively slow or non-existent improvement in emissions intensity – that is behind the high rate of growth in developing country emissions.

Opportunities exist because the technology of energy use in developing countries embodies far higher emissions per dollar of output than does technology used in the United States; this is true of new investment in countries like China and India as well

as their installed base **(See Figure 6.)** The technology embodied in the installed base of capital equipment in China produces emissions at about four times the rate of technology in use in the United States. China's emissions intensity is improving rapidly, but even so its new investment embodies technology with twice the emissions intensity of new investment in the United States. India is making almost no improvement in its emissions intensity, with the installed base and new investment having very similar emissions intensity. India's new investment also embodies technology with twice the emissions intensity of new investment in the United States.

CRAI calculations show that emission reductions can be achieved by closing the technology gap. The potential from bringing the emissions intensity of developing countries up to that currently associated with new investment in the United States is comparable to what could be achieved by the Kyoto Protocol. These are near-term opportunities from changing the nature of current investment and accelerating replacement of the existing capital stock. Moreover, if achieved through transfer of economic technologies it is likely that these emission reductions will be accompanied by overall economic benefits for the countries involved.

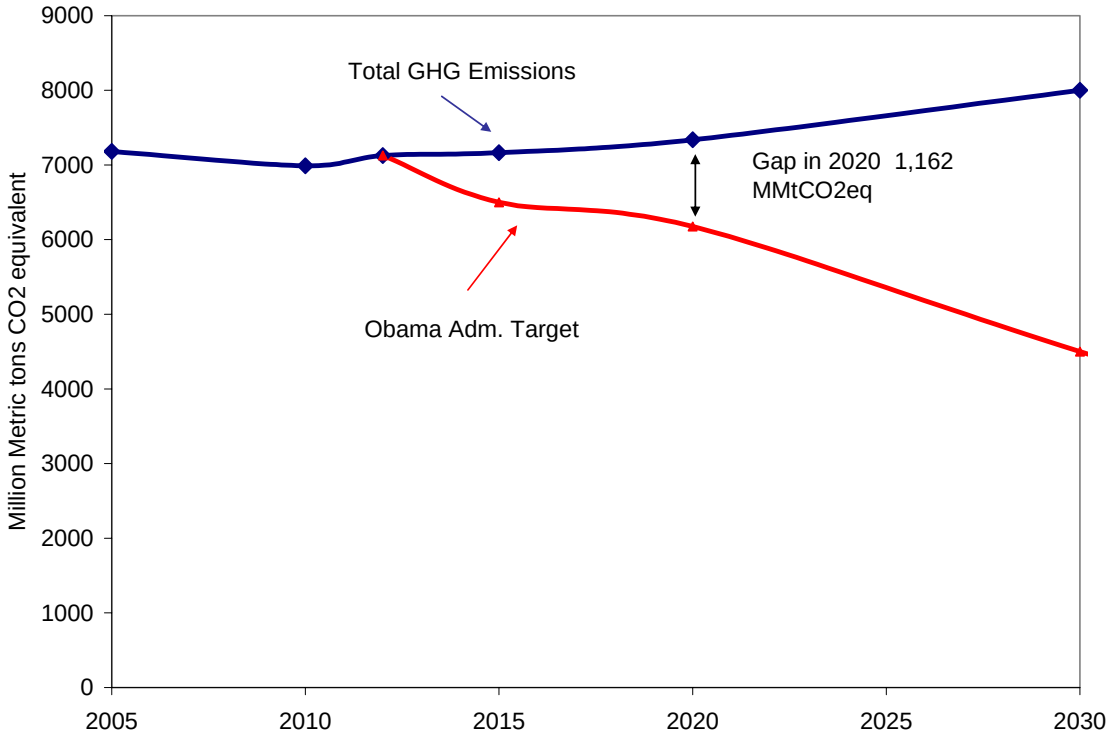
For example, making progress on implementing international programs such as the Asia Pacific Partnership, the Major Economies Meeting process, the Clean Technology Fund and the Global Nuclear Energy Partnership can create new investment opportunities, build local capacity and remove barriers to the introduction of a wide range of cleaner, more efficient technologies that promote both economic growth and a cleaner environment.

- **Conclusions**

To be effective, policies to reduce global GHG emission growth must include both developed and developing countries. Polices that enhance technology development and transfer are likely to be more widely accepted than those that require sharp, near term reductions in per capita energy use. Extending the framework of the Asia Pacific Partnership on Clean Development and Climate and other international partnerships will allow developed countries to focus their efforts where they will get the largest return, in terms of emission reductions for the least cost.

Finally, if the United States does adopt a mandatory greenhouse gas emissions reduction program, serious consideration should be given to implementing a carbon tax rather than an EU style cap and trade system. A key component of any mandatory U.S. program should be allowing emissions to increase as both economic growth and U.S. population increase.

Figure 1. Greenhouse Gas Emissions: Under EIA Baseline Forecast* and Obama Administration Proposal (Million Metric Tons CO2 Equivalent)**



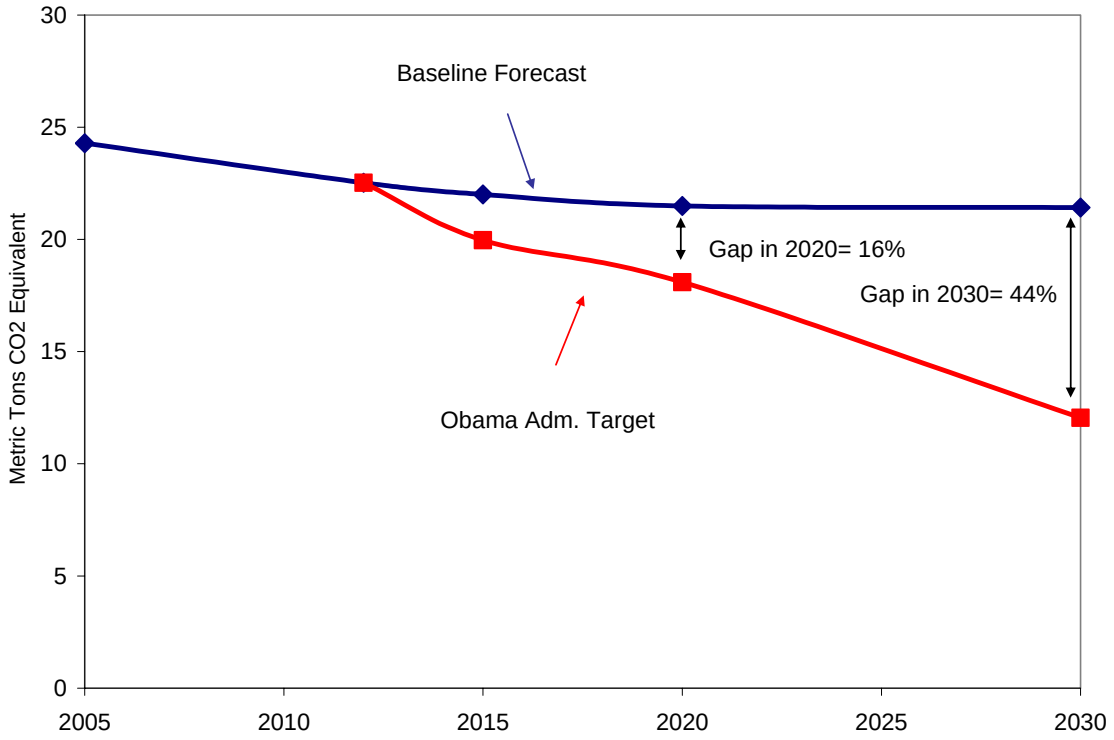
* Baseline forecast calculated by adding energy related CO2 emissions from Annual Energy Outlook 2009 and total other greenhouse gases as forecasted in EIA's S.2191 Analysis
** President Obama's budget proposal specifies a reduction of greenhouse gas emissions 14% below 2005 levels by 2020 and 83% below 2005 levels by 2050.

Sources: "Annual Energy Outlook 2009," Energy Information Administration, Department of Energy, Table 19, http://www.eia.doe.gov/oiaf/aeo/aeoref_tab.html

"Energy Market and Economic Impacts of S.2191, the Lieberman-Warner Climate Security Act of 2007," Energy Information Administration, Department of Energy, Reference Case, Table 20, http://www.eia.doe.gov/oiaf/servicerpt/s2191/excel/aeo2008.xls

"A New Era of Responsibility, Renewing America's Promise," Office of Management and Budget, pg 21, http://www.whitehouse.gov/omb/assets/fy2010_new_era/A_New_Era_of_Responsibility2.pdf

Figure 2. Per Capita Greenhouse Gas Emissions: Under EIA Baseline Forecast* and Obama Administration Proposal (Metric Tons CO2 Equivalent Per Person)**



* Baseline forecast calculated by adding energy related CO2 emissions from Annual Energy Outlook 2009 and total other greenhouse gases as forecasted in EIA's S.2191 Analysis and by dividing by population numbers from U.S. Census.
** President Obama's budget proposal specifies a reduction of greenhouse gas emissions 14% below 2005 levels by 2020 and 83% below 2005 levels by 2050.

Sources: "Annual Energy Outlook 2009," Energy Information Administration, Department of Energy, Table 19, http://www.eia.doe.gov/oiaf/aeo/aeoref_tab.html

"Energy Market and Economic Impacts of S.2191, the Lieberman-Warner Climate Security Act of 2007," Energy Information Administration, Department of Energy, Reference Case, Table 20, http://www.eia.doe.gov/oiaf/servicerpt/s2191/excel/aeo2008.xls

"National Population Projections," U.S. Census Bureau, http://www.census.gov/population/www/projections/files/nation/download/NP2008_D1.xls

"A New Era of Responsibility, Renewing America's Promise," Office of Management and Budget, pg 21, http://www.whitehouse.gov/omb/assets/fy2010_new_era/A_New_Era_of_Responsibility2.pdf

Table 1. Economic Impact of the Lieberman-Warner Bill: Summary of Key Modeling Results			
	2020		
	Allowance Prices (2007$ per metric ton)	GDP Impact (% Change from BAU)	Impact on Jobs (%Change from BAU)
ACCF/NAM-Low Cost[1]	$55	-0.8%	-1,210,000
ACCF/NAM-High Cost[1]	$64	-1.1%	-1,800,000
CRA/NMA[2]	$47	-1.2%	-3,269,000
EIA- NEMS Core Case[3]	$31	-0.3%	-270,000
EIA- NEMS Limited[3]	$44	-0.5%	-450,000
EPA- Scenario 2[4]	$39	-0.7%	-
EPA- Scenario 7[4]	$73	-1.5%	-
MIT- No Offsets, No CCS Subsidy[5]	$72	-0.7%	-
MIT- 15%, CCS Subsidy[5]	$61	-0.8%	-

	2030		
	Allowance Prices (2007$ per metric ton)	GDP (% Change) (% Change from BAU)	Impact on Jobs (%Change from BAU)
ACCF/NAM-Low Cost[1]	$228	-2.6%	-3,100,000
ACCF/NAM-High Cost[1]	$271	-2.7%	-4,100,000
CRA/NMA[2]	$68	-1.0%	-2,393,000
EIA- NEMS Core Case[3]	$62	-0.3%	-280,000
EIA- NEMS Limited[3]	$93	-0.7%	-710,000
EPA- Scenario 2[4]	$64	-0.9%	-
EPA- Scenario 7[4]	$118	-2.3%	-
MIT- No Offsets, No CCS Subsidy[5]	$105	-0.3%	-
MIT- 15%, CCS Subsidy[5]	$89	-0.4%	-

1. "Analysis of The Lieberman-Warner Climate Security Act (S.2191) Using The National Energy Modeling System
(NEMS/ACCF/NAM)," A Report by the American Council for Capital Formation and the National Association of Manufacturers, March 2008.
2. "Economic Analysis of the Lieberman-Warner Climate Security Act of 2007 Using CRA's MRN-NEEM Model," by CRA International, April 2008.
3. "Energy Market and Economic Impacts of S.2191, the Lieberman-Warner Climate Security Act of 2007," by the Energy Information Administration, U.S. Department of Energy, April 2008.
4. "EPA Analysis of the Lieberman-Warner Climate Security Act of 2007," by
the U.S. Environmental Protection Agency, March 2008.
5. "Appendix D: Analysis of the Cap and Trade Features of the Lieberman-Warner Climate Security Act," by MIT.

Figure 3. Obama Administration Climate Revenues (2012-2019) and EIA's Analysis of Lieberman/Warner (S.2191, assuming all allowanced auctioned) ($ in billions)

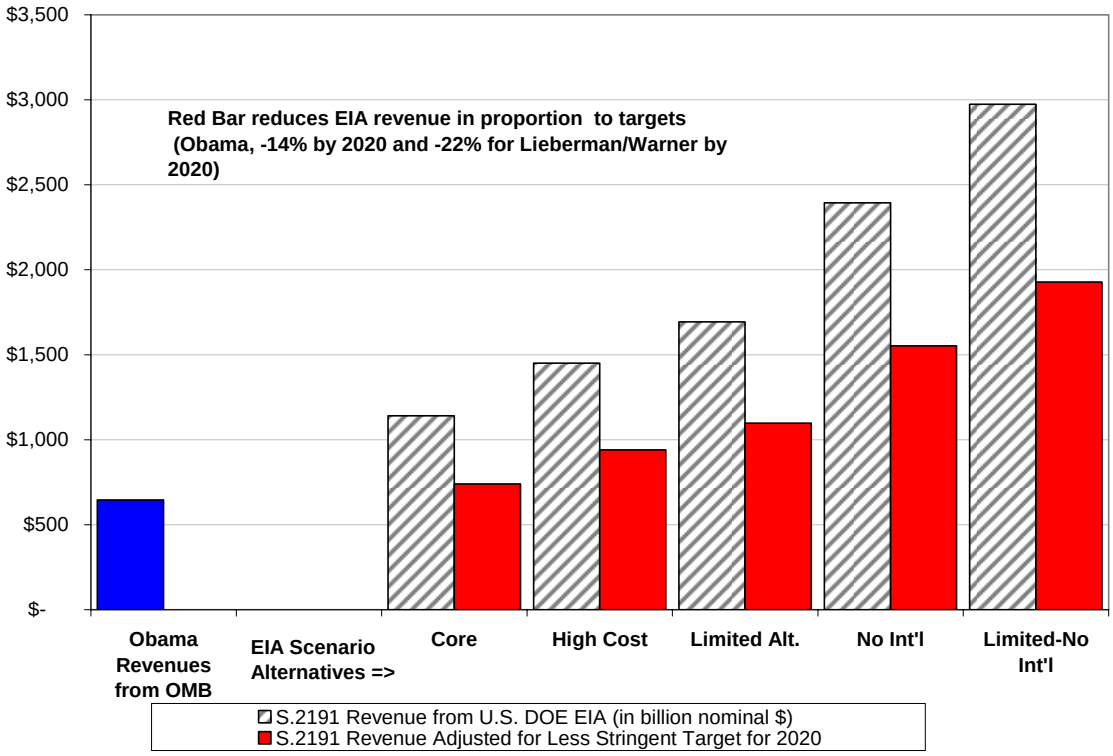
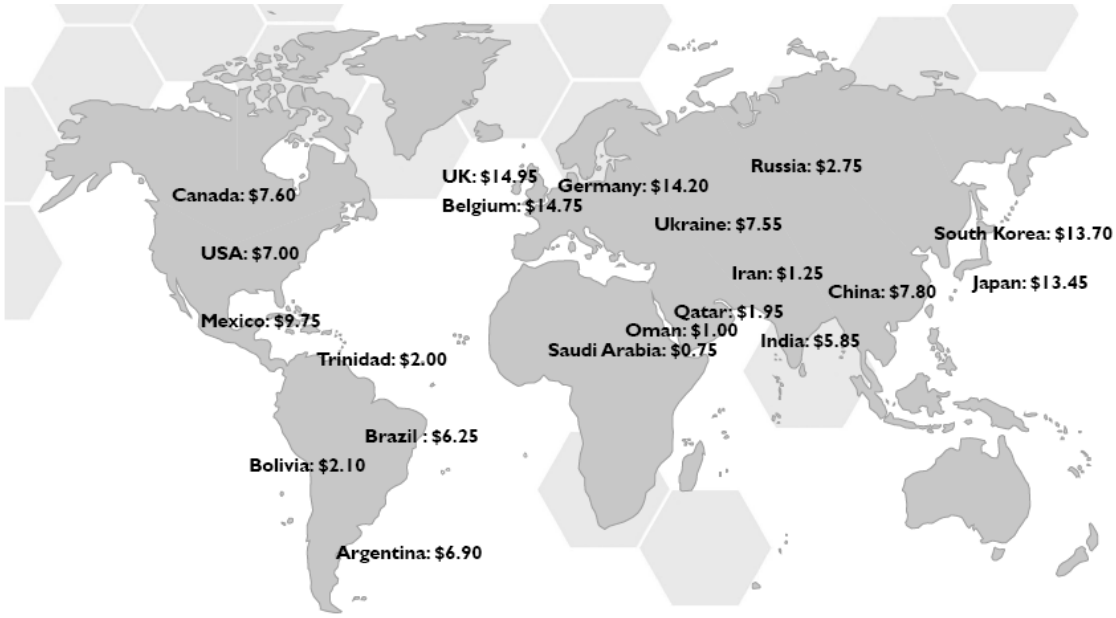


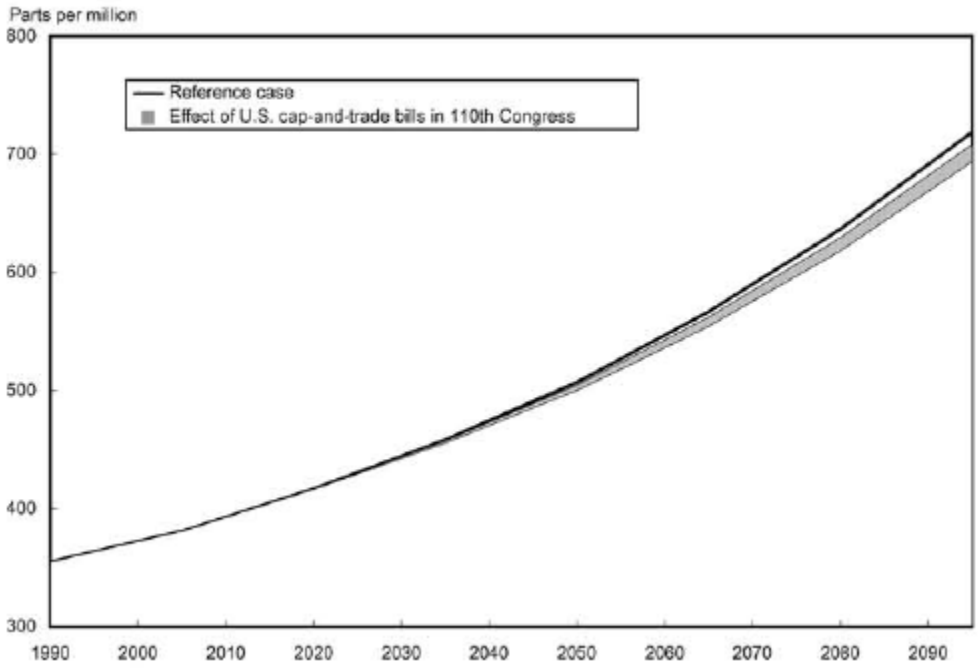
Figure 4. Global Natural Gas Costs - 3rd Quarter 2008 ($US per millions BTUs)



Note: Prices generally reflect domestic wellhead/hub prices or imported prices via pipeline. Some nations (e.g., Japan and Korea) import LNG. Thus, the higher prices. Other nations import LNG but these prices aren't generally reflected in the above.

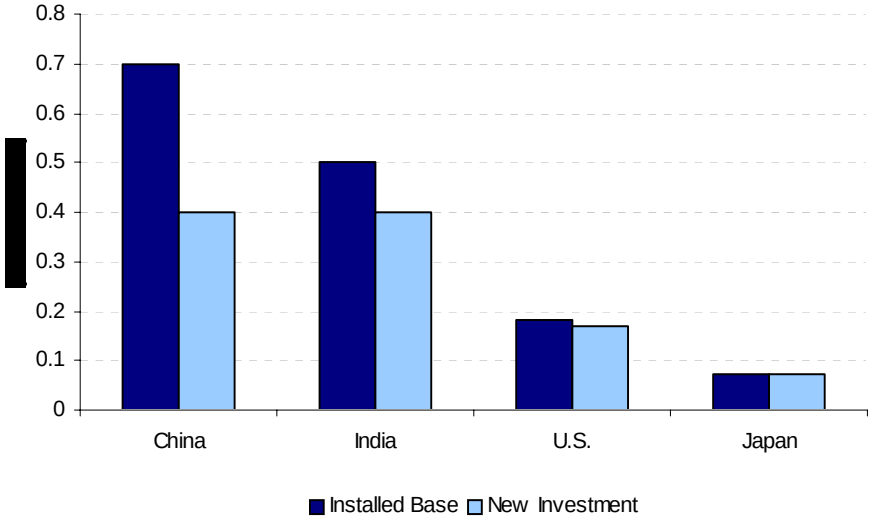
Source: American Chemistry Council

Figure 5. Global CO2 Concentrations
Carbon Emissions are projected to rise over the next several decades



Source: Economic Report of the President, Annual Report of the Council of Economic Advisers, January 2009, Chart 3-6, pg 124.

Figure 6: Greenhouse Gas Emissions Associated with Existing and New Investment in 2001 (Million tons of Carbon per $Billion of Gross Domestic Product at Market Exchange Rates)



Source: Promoting A Positive Climate for Investment, Economic Growth and Greenhouse Gas Reductions, W. David Montgomery and Sugandha Tuladhar (see www.iccfglobal.org.)

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Table 2. International Comparison of Nominal Capital Costs Recovered After Five Years for Selected Energy Investments, 2006

	Electric Generation					Electric Transmission & Distribu Lines		
	Gas	Coal	Nuclear	Combined Heat & Power Generation	Self-Generated Electricity	Transmission Lines	Distribution Lines	Sm Me
United States	37.7%	29.5%	37.7%	29.5%	37.7%	37.7%	29.5%	6
Brazil	37.7%	47.5%	N/A	37.7%	63.1%	20.6%	20.6%	3
Canada	79.6%	79.6%	79.6%	79.6%	79.6%	31.2%	31.2%	6
China	39.8%	39.8%	39.8%	39.8%	39.8%	39.8%	39.8%	3
Germany	30.0%	30.0%	37.5%	30.0%	30.0%	33.1%	33.1%	6
India	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%	10
Indonesia	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	4
Japan	49.7%	49.7%	49.7%	49.7%	45.6%	37.4%	37.4%	4
Rep of Korea	57.7%	57.7%	57.7%	57.7%	57.7%	57.7%	57.7%	5
Malaysia	100.0%	100.0%	100.0%	100.0%	100.0%	90.0%	90.0%	9
Mexico	46.2%	46.2%	46.2%	46.2%	46.2%	23.1%	23.1%	2
Taiwan	49.7%	49.7%	49.7%	49.7%	49.7%	49.7%	49.7%	4

Source: Prepared by the Quantitative Economics and Statistics Group, Ernst & Young LLP, April 25, 2007.

1. Original Ernst & Young study was updated with the change in H.R. 1424 "Emergency Economic Stabilization Act of 2008" reduced the cost recovery period from 20 to 10 years.